Kadi Sarva Vishwavidyalaya, Gandhinagar

MASTERS OF COMPUTER APPLICATION (MCA)
Semester – I (First Year)
Subject: MCA-103 - Database Management System (DBMS)

SUB Total CREDIT	Teaching scheme		Examination scheme				Total Marks
	(per week)		MID	CEC	External		
	Th.	Pr.	Th.	Th.	Th.	Pr.	
4	3	2	25	25	50	50	150

Rationale (Course Objective):
The objective of this course is to provide a strong foundation in database concepts, design and application to the students to groom them with database management skills, like database designer and database management. The subject will emphasis on basic concepts, how to organize, create, maintain and retrieve information from a DBMS and managing DBMS.

Learning Outcome:
Students will learn five components like basic concepts of DBMS, data modeling, database design, implementation and maintenance at the end of this course, which is as under:

- In basic concept they will learn database application needs, database system architecture, types of data, types of database systems etc.
- In data modeling they will learn to develop data model for database system using ER diagrams.
- In database design they will learn functional dependencies, normalization techniques.
- In implementation and maintenance they will learn to populate and query a database using SQL commands like DDL, DML, TCL, and DCL.

Prerequisite:
Knowledge about data and information and its need in information system like business, education, banking etc.

Unit 1 Basic Concepts and Architecture [20%]
- Basic concepts and definitions: Data, Information, Data versus Information, Data warehouse, Metadata, System Catalog, Data items, Records, Files
- Data Dictionary: Components of Data dictionary, Active and Passive data dictionary
- Database, Database system, Functions and Responsibilities Database administrator
- File oriented system versus database system: Advantages and disadvantages of File system, Advantages and disadvantages of Database system, Comparison of File system and Database system
- Database system architecture: Schemas and Instances, Three level database architecture, Data independence, Mappings, Functions of DBMS, Data models

Unit 2 Data Modeling using Entity Relationship Model   [20%]
- The Entity-Relationship Model: Entity sets, Relationship sets, Attributes
- Constraints: Mapping cardinalities, Keys, Participation constraints
- Entity-Relationship Diagrams: Symbols and their meaning in E-R diagram
- Entity-Relationship Design Issues: Use of Entity sets versus Attributes, Use of Entity sets versus Relationship sets, Binary versus n-ary Relationship sets, Placement of Relationship attributes
- Strong and Weak Entity sets
- Extended E-R diagram Features: Specialization, Generalization, Attribute Inheritance, Constraints on Generalization, Aggregation
- Reduction to Relational Schemas: Representation of Strong entity sets, Representation of Weak entity sets, Representation of Relationship sets, Redundancy of Schemas, Combination of Schemas, Representation of Composite and Multivalued attributes, Representation of Generalization, Representation of Aggregation

Unit 3 Relational Database and Database Design:
                    [20%]
- Functional Dependency: Functional dependency diagram and examples, Full functional dependency, Armstrong's axioms for Functional dependencies, Redundant Functional dependencies
- Decomposition: Lossy Decomposition, Lossless-Join decomposition, Dependency-Preserving decomposition
- Normalization and Normal Forms: Need for normalization, 1NF, 2NF, 3NF, BCNF, Properties of Multi-valued dependencies, 4NF, Join dependency, 5NF

Unit 4 Database implementation using SQL
                    [20%]
- Basic datatypes in SQL
- Creating and Managing Tables: CREATE TABLE and ALTER TABLE commands, INSERT, UPDATE and DELETE commands, Viewing data in the Tables, eliminating duplicate rows when using a select statement, Sorting data in a table, Creating a table from a table, Inserting data into a table from another table.
- Creating and Dropping Integrity Constraints: Primary key, Foreign key, Unique key, Not Null, Check
- Computations done on table data: Arithmetic operators, Logical operators, Range searching, Pattern matching
- Database Functions: Scalar and Group functions (Aggregate functions, Numeric functions, String functions), Conversion functions(To_CHAR(), TO_DATE())
- Grouping and Joining data from tables in SQL: GROUP BY Clause and HAVING Clause, Joins (Inner Join, Outer Join, Cross Join, Self Join)

Unit 5 Database transaction processing, Concurrency control and Recovery   [20%]
- Transaction Concept :Transaction execution and problems, Transaction properties(ACID Property), Transaction log
- Concurrency Control: Problems of concurrency control, Permutable actions, Schedule, Serialisable schedules, Locking methods for concurrency control(Lock granularity, Types

of locks and Two-phase locking), Deadlocks, Timestamp method for concurrency control and Optimistic method for concurrency control
- Database Recovery: Database recovery concepts, Types of database failures, Types of database recovery (Redo and Undo), Recovery techniques: Deferred update and Immediate update, Shadow paging, Checkpoints.

Text Book(s):
1. "Database Systems : Concepts, Design and Applications", S K Singh,Pearson Education
2. "Database System Concepts", 5th Edition, Silberschatz, Korth, Sudarshan, McGraw HillPublication
3. "SQL,PL/SQL The programming language of oracle", 3rd revised edition, Ivan Bayross, BPB Publication

Other Reference Books:
1. "An Introduction to Database Systems", 8th Edition, C J Date, A Kannan, S Swaminathan,, Pearson Education (2006)
2. "Database Systems : Design, Implementation and Management", 7th Edition, Peter Rob, Carlos Coronel, Cengage Learning (2007)
3. "Fundamentals of Database Systems", 5th Edition, Elmsari, Navathe,Pearson Education (2008)

List of Practicals

Consider the following tables -

Client_Master (Client_no, Name, Address, City, Pincode, State, Balance_due)
Product_Master (Product_No, Description, Profit_Percent, Unit_Measure, Qty_On_Hand, Reorder_Level, Sell_Price, Cost_Price)
Salesman_Master (Salesman_No, Salesman_Name, Address, City, Pincode, State, Sales_Amount, Target_To_Get, Yearly_targeted_Sales, Remarks)
Sales_Order (Order_No, Order_Date, Client_No, Delivery_Address, Salesman_No, Delivery_type, Billed_Yes_Or_No, Delivery_Date, Order_Status)
Sales_Order_Details (Order_No, Product_No, Qty_Ordered, Qty_Dispatched, Product_Rate)

Exercise-1

1. Create all the tables using proper constraints
2. Apply table level constraint to make sure that qty_on_hand must not be less than or equal to reorder_level in PRODUCT_MASTER table. (use Check Constraint).
3. Insert minimum 10 values in each tables.

Exercise-2

1. Display all clients' information.
2. Display all Clients who stay in 'Delhi'.
3. Display client name and city.
4. Find the names of all clients having 'a' as the second letter in their names.

5. Find out the clients who stay in a city whose third letter is 'a'.
6. Find the list of all clients who stay in 'Bombay' or 'Delhi'.
7. Print the list of clients who's Balance_Due is greater than value 10000.
8. Print the information from Sales_Order table for orders placed in the month of January.
9. Display the order information for Client_No 'C00001' and 'C00002'.
10. Find products whose selling price is greater than 2000 and less than or equal to 5000.
11. Find products whose selling price are more than 1500. Calculate a new selling price as, original selling price * 0.15. Rename the new column in the above query as new_price.
12. List the names, city and state of clients who are not in the state of 'Maharashtra'.
13. Find all the products that's Qty_On_Hand is less than Reorder_Level.
14. Display city from client_master such way that no city should display repeatedly.
15. Display all the details from sales_order table in a descending order of order date.
16. Delete all the details from Client_master.
17. Delete all the details from clients who stay in 'Delhi'.
18. Delete all the records of sales order in which order status in 'C' (i.e Complete).
19. Give 5% raise to sell price of all the products which has profit percent less than 50.
20. Deduct 100 Rs from the balance due for the client no 'C00002'.
21. Add Column 'Mobileno' number(10) in Client_Master Table.
22. Add column 'rank' number (2) in Client_Master table and set its default value to '0'. (use default Clause)
23. Change the size of column 'Mobileno' in Client_Master from 10 to 13.
24. Make 'Mobileno' column in Client_Master as Not Null.
25. Add constraint to 'Rank' column so that value of rank can be in range 0 to 5 only.
26. Remove the constraint created above.
27. Make 'Mobileno' column in Client_Master as it can store unique mobile number of clients.
28. Create a table 'Client_info' from client_master to store all clients info who stays in Mumbai
29. Rename table Client_info to Client_in_Mumbai.
30. Destroy table Client_in_Mumbai.
31. Count total no of clients who are not in the state of 'Maharashtra'.
32. Count the total number of orders.
33. Calculate the average price of all the products.
34. Determine the maximum and minimum product prices. Rename the output as max_price and min_price respectively.
35. Count the number of products having price greater than or equal to 1500.
36. Find all the total no of products that's Qty_On_Hand is less than Reorder_Level.
37. Display first five characters of clients name.
38. Display the order number and day on which clients placed their order.
39. Display the month (in alphabets) and date when the order must be delivered.
40. Display the Order_Date in the format 'DD-Month-YY'. E.g. 18-February-03.
41. Find the date, 15 days after today's date.
42. Find the number of days elapsed between today's date and the delivery date of the order placed by the clients.
43. Display the products no, description, 5% raise in sells price for which the product cost price is less than 100 and profit percentage is less than 2%.
44. Print the Description and Total Qty sold for each product.
45. Find the value of each product sold.
46. Calculate the average qty sold for each client that has a maximum order value of 15000.00.
47. Find out the sum of all the bills ordered for the month of January.
48. Display details of orders for which only two days falls between order date and delivery date.
49. Display month wise total price for each product which are sold in year 2009.
50. Display all the client's name is upper case, whose name is having more than 5 characters.

Joins and Correlation:

51. Find out the products, which have been sold to 'Ivan Bayross'.
52. Find out the products and their quantities that will have to be delivered in the current month.
53. Find the Product_No and Description of a product having highest sell.
54. List the Product_No and Order_No of customers having Qty_Ordered less than 5 from the Sales_Order_Details table for the product '1.44 Floppies'.
56. Find the products and their quantities for the orders placed by 'Ivan Bayross' and 'Vandana Saitwal'.
57. Find the products and their quantities for the orders placed by Client_No 'C00001' and 'C00002'.